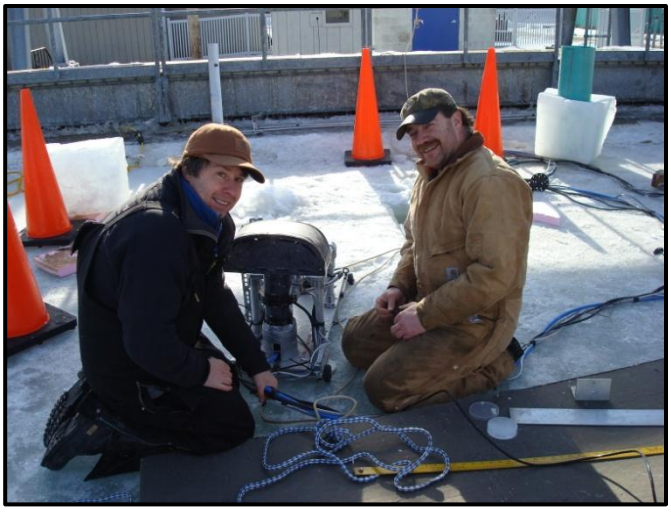
CRREL assists with innovative "under ice" approach to detecting and mapping oil spills in the Arctic

By Marie Darling, ERDC PAO | Feb. 14, 2012 |

The U.S. Army Corps of Engineers Engineer Research and Development Center's Cold Regions Research and Engineering Laboratory (CRREL) hosted onsite testing assistance to researchers with the Woods Hole Oceanographic Institution (WHOI) and the Scottish Association for Marine Science (SAMS), Jan. 16-20. The testing was to evaluate underwater techniques that could be deployed under a cover of sea ice to detect and map oil spills.



Scientist Dr. Jeremy Wilkinson, Scottish Association for Marine Science, left, and CRREL's Bill Burch prepare the submersible trolley for testing within CRREL's Geophysical Research Facility. Attached to the trolley's structure are a suite of sensors that includes cameras, lasers and sonars, in an attempt to detect and map an oil spill from under the ice.

This latest testing, sponsored by the Oil Spill Recovery Institute, explores the possibility of using upward looking capabilities to detect and map oil spills from beneath the ice.

"The Woods Hole and Scottish researchers are experimenting with detection of oil from below the ice cover. This is a new technique and they ultimately want to optimize the sensor suite strategy for deployment on an autonomous underwater vehicle platform," said CRREL Research Civil Engineer Leonard Zabilansky, with the laboratory's Ice Engineering Team. Zabilansky is providing onsite oversight of the testing facility. "This system is intended for use as an alternative, or as a complement, to methods such as airborne or surface-based methods that may be impractical in some ice environments or weather conditions."

The testing is utilizing CRREL's Geophysical Research Facility, a concrete basin measuring 60 ft. long by 22 ft. wide and 7 ft. deep, with a removable refrigerated roof for growing and safeguarding sea ice from solar melt and snow. In preparation for the testing, the basin was sectioned off into three parts and within each section a depression in the underside of the ice was formed. It was within these depressions that crude oil was poured.

The suite of sensors, which includes a black and white camera, color camera, multi-beam sonar, single beam sonar and lasers, was attached to a submersible trolley. The trolley was placed on tracks located at the bottom of the tank. It was then pulled along the tank so that the sensors could monitor the sea ice as well as the oil that was located within the depressions. Data was streamed back so that the scientists could monitor sensor data in real-time on their computer screens.

According to comments from both WHOI and SAMS researchers, the week of testing looked to be very successful.

A beam of green light is emitted from the under ice laser during night testing. (Photo courtesy J. Wilkinson, Scottish Association of Marine Science)

"We just didn't know how the sensors would perform," said SAMS Sea Ice Physicist Dr. Jeremy Wilkinson. "The lasers are very new, whilst the sonar and camera technology has been around for a while. None have been used to detect oil under ice before. It was exciting to see different sonar reflections from the ice and the oil, which had not been seen before. We hoped to detect and map oil under the ice and we did. But we really don't know how effective the sensors were or their limitations– we'll have to wait and see as we analyze the data back at the office."

This is the first of three weeks of scheduled oil spill response testing to be conducted at CRREL.

"Evaluating this technology adds another tool to the responders' toolbox for protecting the delicate Arctic environment," said Zabilansky. "With research like that being done by WHOI and SAMS, responders can quickly and more effectively mitigate an oil spill disaster in an Arctic region."

Learn more about CRREL's support to innovative oil spill response testing at http://www.crrel.usace.army.mil/innovations/oil_spill_research/.